

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

**SEMICONDUCTOR ENERGY
LABORATORY CO., LTD.**

**398, Hase, Atsugi-shi,
Kanagawa
2430036
Japan**

Date of mailing
(day/month/year)

01. 3. 2005

Applicant's or agent's file reference

00000PCT7505**FOR FURTHER ACTION**

See paragraph 2 below

International application No.

PCT/JP2004/016814

International filing date (day/month/year)

05.11.2004

Priority date (day/month/year)

14.11.2003

International Patent Classification (IPC) or both national classification and IPC

Int.Cl. **G09F9/00, H05B33/14, H01L29/786, H01L21/288, H01L27/088**

Applicant

SEMICONDUCTOR ENERGY LABORATORY CO., LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Date of completion of this opinion

Name and mailing address of the ISA/JP

Japan Patent Office**3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan**

Authorized officer

Hajime KitagawaTelephone No. **+81-3-3581-1101 Ext. 3274****2M 9804**

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/JP2004/016814

Box No. I

Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material
☐ a sequence listing
☐ table(s) related to the sequence listing

 - b. format of material
☐ in written format
☐ in computer readable form

 - c. time of filing/furnishing
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/JP2004/ 016814

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>2-11, 13-47</u>	YES
	Claims	<u>1, 12</u>	NO
Inventive step (IS)	Claims		YES
	Claims	<u>1-47</u>	NO
Industrial applicability (IA)	Claims	<u>1-47</u>	YES
	Claims		NO

2. Citations and explanations

- D1: JP 7-312290 A (NEC CORPORATION) 1995.11.28
paragraph [0037]-[0047] , figs. 2-4
- D2: JP 2003-058077 A (FUJI PHOTO FILM CO., LTD.) 2003.02.28
whole document
- D3: JP 2000-259099 A (SEIKO EPSON CORPORATION) 2000.09.22
paragraph[0028],[0040], figs.3,8
- D4: JP 2000-269336 A (TOSHIBA CORPORATION) 2000.09.29
whole document
- D5: JP 2001-281438 A (SEIKO EPSON CORPORATION) 2001.10.10
paragraph [0039],[0054],figs.1-12
- D6: JP 2003-050405 A (MATSUSHITA ELECTRIC INDUSTRIAL Co., LTD.) 2003.02.21
paragraph [0078]-[0088], figure 14,15

The subject matter of claim 1 does not meet the requirement of novelty.

D1 discloses EL device having a current control transistor of which gate electrode is connected to a drain electrode of the switching transistor (figs. 2-4).

Although D1 does not disclose explicitly the technical feature SiO₂ layer covers both the current control transistor and the switching transistor, this feature is commonly used art.

The subject matter of claim 2 does not involve an inventive step over D1 and D2 for the following reasons.

D2 discloses that a forming process of gate electrodes on a substrate having photocatalytic surface (e.g. TiO₂ layer) by inc jet method simplifies the manufacturing process of a TFT array.

The technical feature "a first transistor including a first gate electrode which is formed by a droplet discharge method" is not disclosed in D1. However, the person skilled in the art would easily conceive the idea of applying the technical feature employed in D2 to the invention disclosed in D1 to simplify the manufacturing process of a TFT array.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: V

The subject matter of claim 3 does not involve an inventive step over D1 and D2 because D1 discloses N-(2,4-xylyl)-4-aminonaphtal imide is formed as the space layer 52c (paragraph [0044]).

The subject matter of claim 4 does not involve an inventive step over D1 and D2 because the stacked layer of EL described in claim 4 is a common structure for EL.

The subject matters of claims 5,6,8 do not involve an inventive step over D1 and D2 because the features are disclosed in D2.

The subject matter of claim 7 does not involve an inventive step over D1 and D2 because the metals specified in claim 7 are commonly used for electrodes.

The subject matter of claim 8 does not involve an inventive step over D1, D2 and D3 because D3 discloses that a protective circuit 65, 75.

The subject matter of claim 9 does not involve an inventive step over D1 and D2 because a television receiver is a well-known use of EL display.

Claims 12-17 are methods for fabricating a display device and as such also do not meet the requirements with respect to novelty and inventive step.

The subjects matters of claim 18-21 do not involve an inventive step over D1 and D2 because D1 discloses that the second contact hole 56B is formed over a drain electrode of a current control transistor and the second contact hole 56B is filled with aluminium alloy and because D2 discloses manufacturing of EL by inc jet (paragraph [0004]).

The subjects matters of claim 22-30 do not involve an inventive step over D1, D2, D3, D4 and D5 for the following reasons. Forming a contact hole by using a columnar film as a sacrifice layer is a well-known art like disclosed in D4. And D5 discloses using an organic molecular film repellent to ink for ink jet method.

The person skilled in the art would easily conceive the idea of using an organic film repellent to the ink to the invention disclosed in D2 for the use of ink jet method.

The subjects matters of claim 31-35 do not involve an inventive step over D1, D2 and D6 because the person skilled in the art would easily conceive the idea of replace bottom gate transistors disclosed in D1 with the top gate transistors disclosed in D6.

The subjects matters of claim 31-35 do not involve an inventive step over D1 and D2 because the person skilled in the art would easily conceive the idea of replace bottom gate transistors disclosed in D1 with the top gate transistors disclosed in D6.

The subjects matters of claim 31-35 do not involve an inventive step over D1 and D2 for the reasons described above.

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

**SEMICONDUCTOR ENERGY
LABORATORY CO., LTD.**

**398, Hase, Atsugi-shi,
Kanagawa
2430036
Japan**

Date of mailing
(day/month/year)

15. 2. 2005

Applicant's or agent's file reference
00000PCT7507

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/JP2004/016795

International filing date (day/month/year)

05.11.2004

Priority date (day/month/year)

14.11.2003

International Patent Classification (IPC) or both national classification and IPC

Int.Cl. **G02F 1/1368, G02F 1/1339, H01L 21/288**

Applicant

SEMICONDUCTOR ENERGY LABORATORY CO., LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 56.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Date of completion of this opinion

01.02.2005

Name and mailing address of the ISA/JP

Japan Patent Office

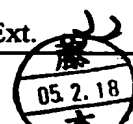
3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan

Authorized officer

YAMAGUCHI, Hiroyuki

Telephone No. +81-3-3581-1101 Ext.

2X 3411



WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2004/016795

Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

International application No.
PCT/JP2004/016795

1. Statement

Claims

1-12

YES

Claims

NO

Claims

7-12

YES

Claims

1-6

NO

Claims

1-12

YES

Claims

NO

D1 : JP 2003-318133 A(SEIKO EPSON Co., Ltd.)

2003.11.07, claim 11,20, paragraph [0022], [0036], [0039]

D2 : JP 2003-315829 A(SEIKO EPSON Co., Ltd.)

2003.11.06, claim 15, paragraph [0074]-[0075], Fig.8

The subject matter of claims 1-6 do not appear to involve an inventive step in view of the documents 1-2 cited in the ISR.

Claim 11 of D1 discloses the method for forming film pattern by droplet discharge method, and the method includes forming lyophilic and lyophobic patterns. And claim 20 of D1 discloses semiconductor device consisting of source electrode, drain electrode, and gate electrode, which are formed by droplet discharge method. Furthermore, paragraph [0036] and [0039] discloses an idea that fluid used in droplet discharge method contains conductive particles, such as gold, silver, palladium, nickel.

Paragraph [0074]-[0075] of D2 discloses an idea that the connecting portion 28 for accomplishing the electrical connection between one side of the source/drain regions 22 and the pixel electrode is formed by droplet discharge method.

Therefore, a person skilled in the art could have easily arrived at the invention in claim 1,2,4 by forming the connecting portion between drain electrode and pixel electrode at the semiconductor device of D1.

Regarding for claim 3, D1 does not disclose an idea of using photocatalyst. However, paragraph [0022] of D1 discloses an idea of making a substrate lyophilic by irradiating UV, and photocatalyst also changes its property by UV. So, a person skilled in the art could have easily arrived at the idea of using photocatalyst.

Regarding for claim 5, thin film transistor including amorphous semiconductor or a semiamorphous semiconductor is well-known.

Regarding for claim 6, using liquid crystal display for television receiver is well-known art.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2004/016795

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: **Box No. V**

Claim 7-12

The subject matter of claims 7-12 is considered to involve an inventive step over the documents 1-2 cited in the international search report.

D1-D2 do not disclose the steps of:

forming a columnar conductive film over one of the source and drain electrodes;

forming a second insulating film covering the columnar conductive film and the thin film transistor;

or the steps of:

forming a columnar organic film over one of the source and drain electrodes;

forming a second insulating film covering the columnar organic film and the thin film transistor;

removing the columnar organic film.